

SERVICE MANUAL

QUARTZ PLL SYNTHESIZER TUNER

SANSUI T-900/900L

(Silver & Black Model)

T-700/700L

(Silver & Black Model)



CAUTION

1. Parts identified by the Δ symbol on the schematic diagram and the parts list are critical for safety. Use only replacement parts that have critical characteristics recommended by the manufacturer.
2. Make leakage-current or resistance measurements to determine that exposed parts are acceptably insulated from the supply circuit before returning the appliance to the customer.

Sansui

SANSUI ELECTRIC CO., LTD.

•SPECIFICATIONS

T-900/700

FM Section

Tuning range	88 to 108 MHz
Usable sensitivity	
Mono IHF	10.8 dBf (1.9 μ V: T-100)
DIN	0.9 μ V
50 dB quieting sensitivity	
Mono	16.5 dBf
Stereo	37.0 dBf
Signal to noise ratio at 65 dBf	
Mono	75 dB
Stereo	70 dB
Distortion at 65 dBf	
Mono	Less than 0.15% at 1,000 Hz
Stereo	Less than 0.2% at 1,000 Hz
Alternate channel selectivity (at 400 kHz)	
Stereo	55 dB
Stereo separation	40 dB at 1,000 Hz
Frequency response	30 to 15,000 Hz
+1.0 dB, -1.5 dB	
Antenna input impedance	300 ohms balanced
	75 ohms unbalanced

AM Section

Tuning range	530 to 1,600 kHz
Usable sensitivity (Loop antenna)	53 dB/m (446 μ V/m)
Signal to noise ratio	45 dB
Image response ratio	40 dB at 1,000 kHz
Others	
Output voltage and impedance	500 mV/2.2 kohms
Power requirements	120/220/240V (50/60 Hz)
For U.S.A. and Canada	120V (60 Hz)
Power consumption	10 watts
Dimensions	430 mm (16-15/16") W
	78 mm (3-1/8") H
	225 mm (8-7/8") D
Weight	2.5 kg (5.5 lbs.) net
	3.2 kg (7.1 lbs.) packed

T-900L/700L

FM Section

Tuning range	88 to 108 MHz
Usable sensitivity	
Mono IHF	10.8 dBf (1.9 μ V: T-100)
DIN	0.9 μ V
50 dB quieting sensitivity	
Mono	16.5 dBf
Stereo	37.0 dBf
Signal to noise ratio at 65 dBf	
Mono	75 dB
Stereo	70 dB
Distortion at 65 dBf	
Mono	Less than 0.15% at 1,000 Hz
Stereo	Less than 0.2% at 1,000 Hz
Alternate channel selectivity (at 400 kHz)	
Stereo	55 dB
Stereo separation	40 dB at 1,000 Hz
Frequency response	30 to 15,000 Hz
+1.0 dB, -1.5 dB	
Antenna input impedance	300 ohms balanced
	75 ohms unbalanced

AM (MW, LW) Section

Tuning range	MW: 530 to 1,600 kHz
	LW: 153 to 281 kHz
Usable sensitivity	MW: 53 dB/m (446 μ V/m)
	LW: 62 dB/m
Signal to noise ratio	45 dB
Image response ratio	MW: 40 dB at 1,000 kHz
	LW: 35 dB at 220 kHz

Others

Output voltage and impedance	500 mV/2.2 kohms
Power requirements	220/240V (50/60 Hz)
Power consumption	10Watts
Dimensions	430 mm (16-15/16") W
	78 mm (3-1/8") H
	225 mm (8-7/8") D
Weight	2.5 kg (5.5 lbs.) net
	3.2 kg (7.1 lbs.) packed

- * Design and specifications subject to changes without notice for improvements.
- * Due to local laws and regulations, this unit sold in some areas are not equipped with variable voltage selectors.

CAUTION

1. The symbols, UL, CSA, SA, BS, UK, EU, AS, XX <EXPORT> and XX-V <EXPORT(V)> on the parts list and the schematic diagram mean followings respectively.

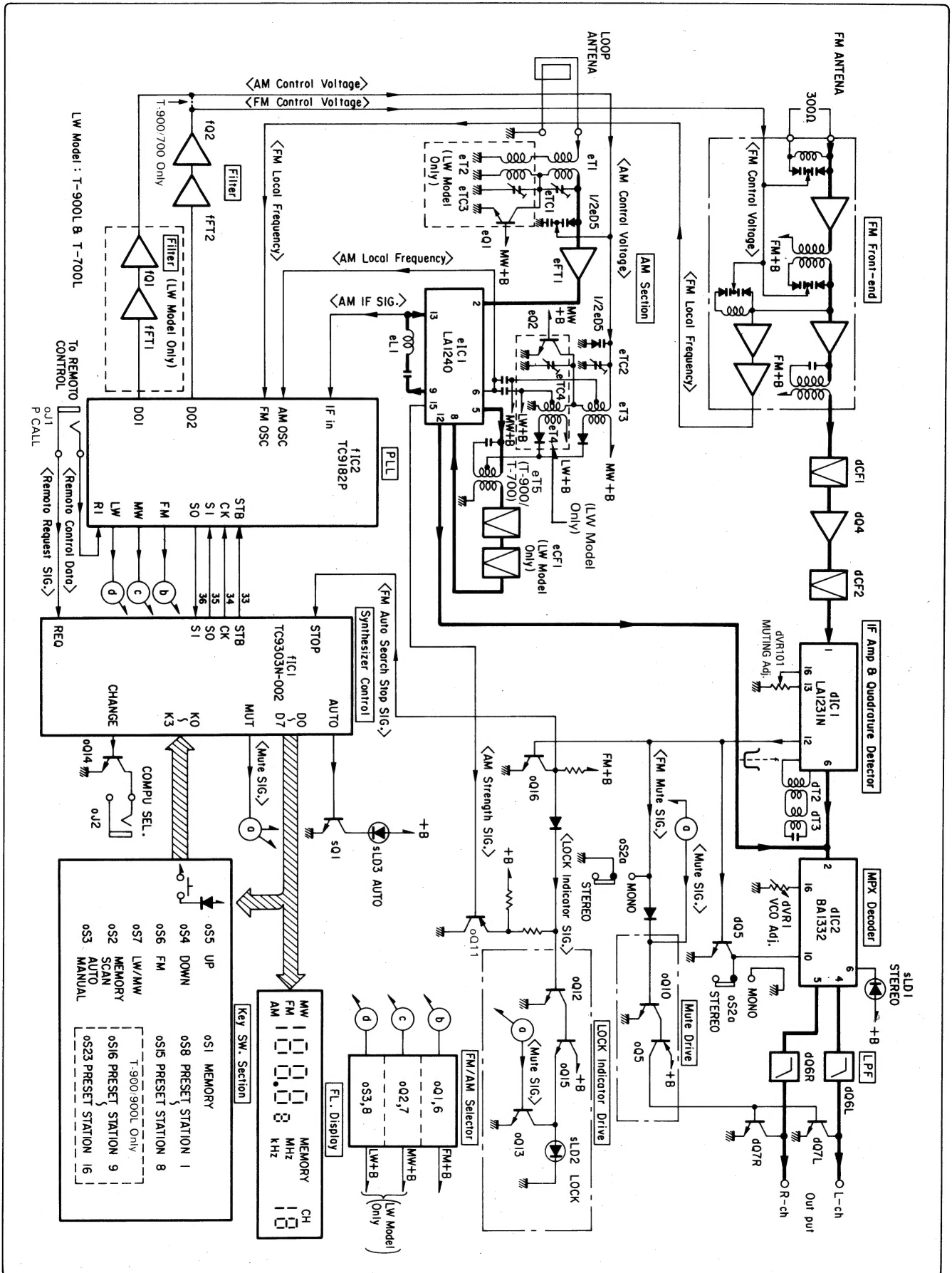
UL.....	Manufactured for U.S.A market. (Underwriters Laboratories approved model.)
CSA	Manufactured for Canadian market.
SA.....	Manufactured for South African market.
BS, UK.....	Manufactured for United Kingdom market.
EU	Manufactured for European market.
AS.....	Manufactured for Australian market.
XX <EXPORT>	Standard Version with Inner Voltage Selector.
XX-V <EXPORT(V)>	Standard Version with Outer Voltage Selector.
NON MARK	Common Parts.

2. Some printed circuit boards are not supplied as the assembled.
To separate these in this service manual, the stock No's are not indicated at the ends of the board names. However, the individual parts on the circuit boards are provided by orders.
3. Since some of capacitors and resistors are omitted from parts lists in this service manual, refer to the Common Parts List for capacitors & resistors, which was issued on February 1983.
4. Abbreviations in this service manual are as follows.

•Abbreviations List

C.R. : Carbon Resistor	E.B.L. : Low Leak Bi-Polar
S.R. : Solid Resistor	Electrolytic Capacitor
Ce.R. : Cement Resistor	Ta.C. : Tantalum Capacitor
M.R. : Metal Film Resistor	F.C. : Film Capacitor
F.R. : Fusing Resistor	M.P. : Metalized Paper Capacitor
N.I.R. : Non-Inflammable Resistor	P.C. : Polystyrene Capacitor
A.R. : Array Resistor	G.C. : Gimmic Capacitor
C.C. : Ceramic Capacitor	A.C. : Array Capacitor
C.T. : Ceramic Capacitor,	V.R. : Variable Resistor
Temperature Compensation	S.V.R. : Semi Variable Resistor
E.C. : Electrolytic Capacitor	SW. : Switch
E.L. : Low Leak Electrolytic	Chip R. : Chip Resistor
Capacitor	Chip C. : Chip Capacitor
E.B. : Bi-Polar Electrolytic	
Capacitor	

1. BLOCK DIAGRAM



2. ADJUSTMENTS

2-1. FM Adjustment (See Top View on Page 10)

Fig. 2-1

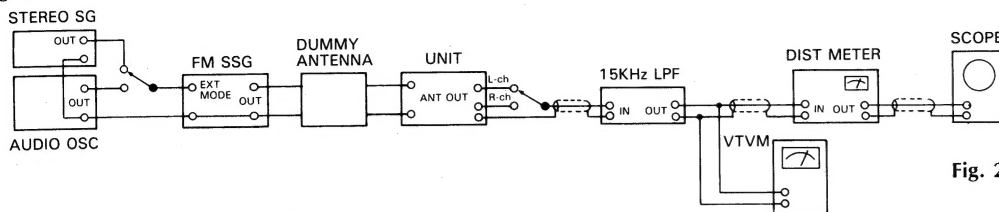


Fig. 2-2

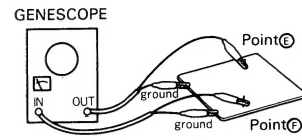
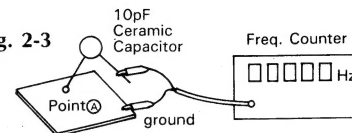


Fig. 2-3



1) FM IF & Reference Frequency Adjustment

- Note: 1. SELECTOR..... FM
2. FM MUTING/MODE..... OFF/MONO

STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
		FROM	TO				
1.	Reference Frequency Adj. (T-900L/700L)	No Input	_____	Between Point A (Pin 40 of fIC1) through 10pF Capacitor & Earth Freq. Counter •See Parts Location F-4841 on page 6	fTC1 (F-4841)	7.2MHz \pm 500Hz	
2.	IF Coil Adj.	98MHz ANT Input 20dBf (14.8dB), 1kHz (100% MOD.), FM SSG	ANT terminal 300 Ω	Between Point B (dVR101) & Earth DC Volt Meter •See Parts Location F-4839 on page 5	IFT Coil (Front-end, F-4839)	Max. DC Volt	
3.	Discriminator Coil Adj. In case of using Genescope	1 No Input	_____	Between Point C (Pin 7 of dIC1) & Point D (Pin 10 of dIC1) DC Volt Meter •See Parts Location F-4853 on page 9	dT2 (F-4853)	DC 0V \pm 30mV	•Repeat procedures as stated in subject 1 & 2.
		2 Output 80dB, Genescope	Point E (dCF1)	Between Point F (Pin 6 of dIC1) & Earth •See Parts Location F-4853 on page 9	dT3 (F-4853)	Steep linearity of S curve. Make symmetrical S curve.	
	Discriminator Coil Adj. In case of using Dist meter	1 No Input	_____	Between Point C (Pin 7 of dIC1) & Point D (Pin 10 of dIC1) DC Volt Meter •See Parts Location F-4853 on page 9	dT2 (F-4853)	DC 0V \pm 30mV	•Repeat procedures as stated in subject 1 & 2.
		2 98MHz ANT Input 65dBf (59.8dB), 1kHz (100% MOD.), FM SSG	ANT terminal 300 Ω	•LINE OUT L-CH or R-CH Dist Meter & SCOPE	dT3, (F-4853)	Min. THD	

•ADJUSTMENT FOR FM

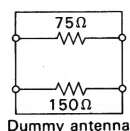
There are two kind in indication of FM SSG output attenuator

- Attenuator with marking of 75 Ω open open indication type.
- Attenuator with marking of 75 Ω load or close load or close indication type.

FM SSG output level in this FM adjustment are described as open indication type.

To feed FM signal, a dummy antenna circuit as Fig. 2-3 must be connected between FM SSG output and ANT terminal (300 Ω) of the unit.

Fig. 2-4



- The following table shows relations among FM SG attenuator indication (dB), available power ratio (dBf) and antenna terminal voltage (dB/ μ V) in each indication type.

	FM SG Attenuator Indication	Available Power Ratio	Antenna Terminal Voltage
Open indication type	0 dB 66 dB	-0.8 dBf 65.2 dBf	-6 dB/ μ V 60 dB/ μ V
Load or close indication type	0 dB 60 dB	5.2 dBf 65.2 dBf	0 dB/ μ V 60 dB/ μ V

2) FM STEREO Adjustment

1. FM MODE..... AUTO

STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
		FROM	TO				
1.	PLL VCO Adj.	98MHz ANT Input 65dBf (59.8dB), FM SSG, Pilot 19kHz (9% MOD.), R or L MODE 1kHz+Pilot (100% MOD.), STEREO SG	ANT terminal 300Ω	Stereo Indicator	dVR1 (F-4854)	Light indicator	•Adjust the dVR1 within center of light level
	PLL VCO Adj. In case of using Freq.	98MHz ANT Input 65dBf (59.8dB), FM SSG, No MOD.	Same as above	Between PointⓈ (Pin 12 of dIC2) & Earth Freq. Counter •See Parts Location F-4854 on page 9	dVR1 (F-4854)	19kHz ± 25Hz	
2.	Muting level Adj.	98MHz ANT Input 25dBf (19.8dB), FM SSG, Pilot 19kHz (9% MOD.), L or R MODE 1kHz+Pilot (100% MOD.), STEREO SG.	Same as above	Stereo indicator LINE OUT L-CH or R-CH VTVM & SCOPE	dVR101 (F-4839)	Stereo indicator turns ON or Output Signal comes out	

◆ Selection of Intermediate Frequencies (FM)

- When the central frequency (shown by a color) of the ceramic filter is changed, the following connection must be made by using diodes.
- Unity the color marks of the FM ceramic filters (dCF1, dCF2) on the F-4853 with the same color.

1. Europe & America

Colouring	Intermediate frequency	Connecting Position of diodes on F-4841	
		fD27	fD28
BLACK	10.650 MHz	○	—
RED	10.700 MHz	○	○
WHITE	10.750 MHz	—	○

2. South Africa

BLACK	10.650 MHz	—	○
RED	10.700 MHz	○	○
WHITE	10.750 MHz	○	—

◆ Abbreviations

Equipment	
AM FM Generator Oscilloscope.....	Genescope
AM Standard Signal Generator.....	AM SSG
FM Standard Signal Generator.....	FM SSG
FM Stereo Generator.....	Stereo SG
Oscilloscope.....	Scope
Audio Oscillator.....	Audio Osc.
Distortion Meter.....	Dist. Meter

Others

Antenna.....	ANT.
Modulation.....	MOD.
Total Harmonic Distortion.....	T.H.D.

2-2. AM Adjustment (See Top View on Page 10)

Fig. 2-5

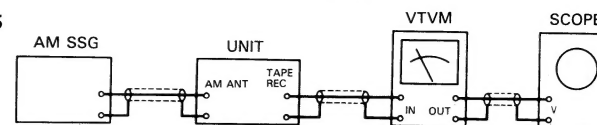
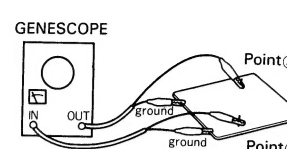


Fig. 2-6



1) AM IF Adjustment & MW (AM) Tuning Adjustment

Note: 1. SELECTOR..... AM or MW
2. Connect AM loop antenna to AM antenna terminal.

STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
		FROM	TO				
1.	IF Coil Adj.	Genescope Output 60dB	PointⓈ (Pin 2 of eIC1) (F-4847)	Between PointⓈ (Pin 12 of eIC1) & Earth •See Parts Location F-4847 on page 8	eT5 (T-900/700), eCF1 (T-900L/700L), eL1 (F-4847)	Max, Waveform	
2.	522kHz (or 520kHz) Tuning Adj.	No Input	—	Between PointⓈ (eR1) & Earth DC Volt Meter •See Parts Location F-4846 on page 8	eT3 (F-4846)	1V ± 0.1V	•Repeat procedures as stated in subject 2 & 3.
3.	1602kHz (or 1610kHz) Tuning Adj.	No Input	—	Same as above	eTC2 (F-4846)	8V ± 0.1V	
4.	603kHz (or 600kHz) RF Adj.	603kHz (or 600kHz) ANT Input 30dB 400Hz (30% MOD.), AM SSG	ANT terminal	LINE OUT L-CH or R-CH VTVM & SCOPE	eT1 (F-4846)	Max. Output	
5.	1404kHz (or 1400kHz) RF Adj.	1404kHz (or 1400kHz) ANT Input 30dB 400Hz (30% MOD.), AM SSG	Same as above	LINE OUT L-CH or R-CH VTVM & SCOPE	eTC1 (F-4846)	Max. Output	

2) LW Tuning Adjustment (T-900L/700L only) (See Parts Location F-4846 on page 8)

Note: SELECTOR..... LW

STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
		FROM	TO				
1.	153kHz Tuning Adj.	No Input	—	Between PointⓈ (eR1) & Earth DC Volt Meter	eT4 (F-4846)	1V ± 0.1V	•Repeat procedures as stated in subject 1 & 2.
2.	281kHz Tuning Adj.	No Input	—	Same as above	eTC4 (F-4846)	8V ± 0.1V	
3.	170kHz RF Adj.	170kHz ANT Input 30dB 400Hz (30% MOD.), AM SSG	ANT terminal	LINE OUT L-CH or R-CH VTVM & SCOPE	eT2 (F-4846)	Max. Output	
4.	260kHz RF Adj.	260kHz ANT Input 30dB 400Hz (30% MOD.), AM SSG	Same as above	LINE OUT L-CH or R-CH VTVM & SCOPE	eTC3 (F-4846)	Max. Output	

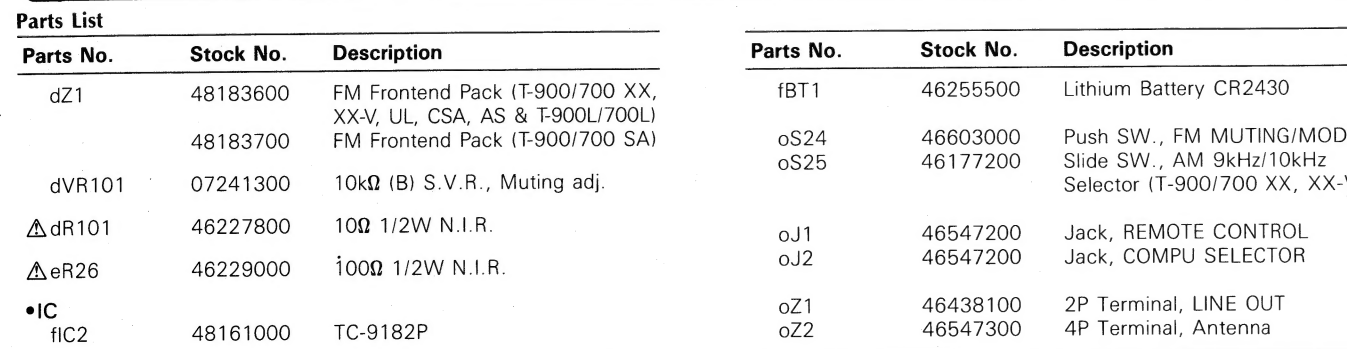
◆ NOTES

When the user moves to different channel step area on FM or AM, the following arrangements must be performed.

	Sets Applicable to	Channel Step Frequency		Parts (F-4841)				9k/10k Switch oS25
		AM	FM	fD20	fD21	fD22	fD23	
I	Europe	9kHz	50kHz	—	—	○	○	None
	America	10kHz	100kHz	—	—	—	—	None
	South Africa	9kHz	50kHz	○	○	○	—	None
II	Sets which 9k/10k Switch is installed	9kHz	50kHz	—	○	○	—	9 kHz
		10kHz	100kHz	—	○	○	—	10 kHz

•Note: 1) ○ = Connect, — = Remove
2) oS25 = AM 9k/10k Switch on F-4839

3-1. F-4839 FM Front end & PLL Synthesizer Board (Stock No. 00888501=T-900/700 XX, XX-V) (Stock No. 00888502=T-900/700 UL, CSA, AS & T-900L/700L) (Stock No. 00888504= T-900/700 SA)
Component Side



Parts No.	Stock No.	Description
•Transistor		
△mQ1	03083901	2SD313AL
△	or 46546701	2SD880
mQ2	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
mQ3	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
•IC		
△mIC1	46144300	NJM78M06A
△	or 46361200	L78N06
•Diode		
△mD1	46273600	DBB10-B
△mD2	46273600	DBB10-B
mD3	03117600	1S2473T77
	or 46086000	1S1588TP-3

Parts No.	Stock No.	Description
mD4	03117600	1S2473T77
	or 46086000	1S1588TP-3
mD5	03111600	1S2473
•Zener Diode		
mDZ1	46104000	05Z13-Y
	or 46104100	05Z13-Z
mDZ3	46116000	05Z24-Y
△ mR2	46230200	1kΩ 1/2W N.I.R.
△ mR3	46227600	6.8Ω 1/2W N.I.R.
△ mR5	46229000	100Ω 1/2W N.I.R.
△ mR8	46227800	10Ω 1/2W N.I.R.
mC6	48108200	2.2μF 50V E.B.
△ pS1	48186800	Push SW., POWER (T-900/700 XX, XX-V, SA, AS & T-900L/700L)
△	48186900	Push SW., POWER (T-900/700 UL, CSA)

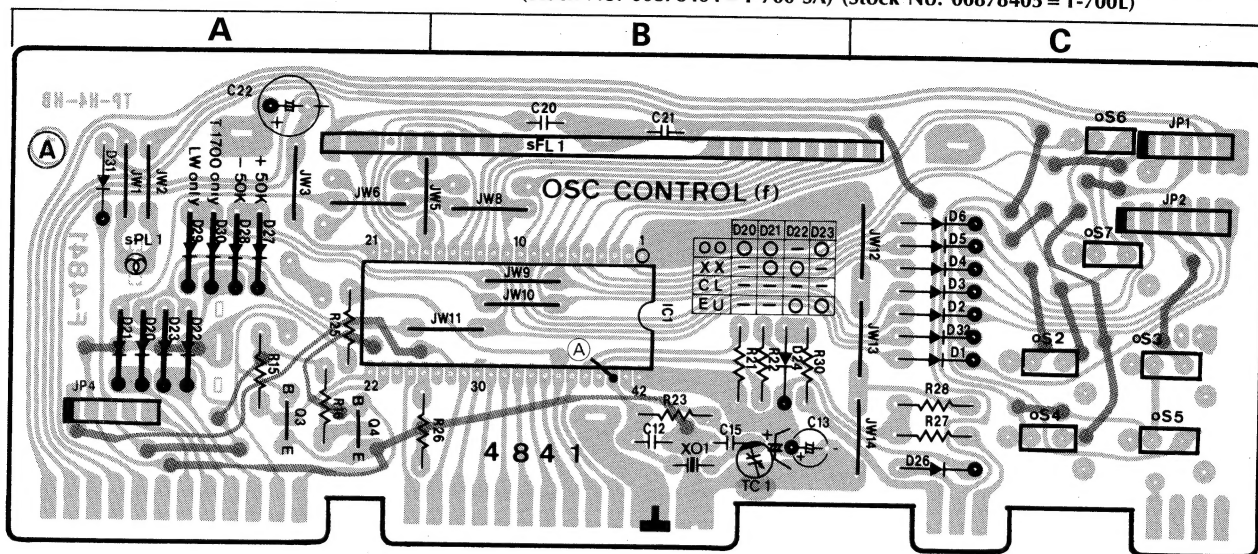
The schematic diagram illustrates the internal structure of the 4842 circuit. It features three stages of signal processing, each consisting of a diode (LD3, LD2, LD1) and a resistor (R4, R3, R2, R1, R5). The input signal enters from the left, passing through a series of resistors and diodes to the output. The circuit is labeled with component values and a 4842 label.

Parts No.	Stock No.	Description
• Transistor		
sQ1	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
• LED		
sLD1	46176900	TLS-123
sLD2	07250900	TLG-123A
sLD3	07250900	TLG-123A

3-4. F-4841 PLL Synthesizer Control Board

(Stock No. 00881901=T-900 XX, XX-V) (Stock No. 00881902=T-900 UL, CSA)
 (Stock No. 00881904=T-900 SA) (Stock No. 00881905=T-900L)
 (Stock No. 00878401=T-700 XX, XX-V) (Stock No. 00878402=T-700 UL, CSA)
 (Stock No. 00878404=T-700 SA) (Stock No. 00878405=T-700L)

Component Side



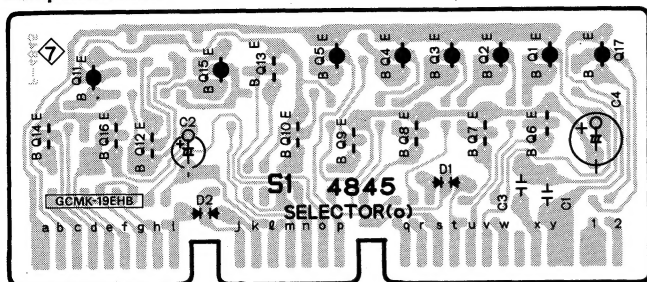
Parts List

Parts No.	Stock No.	Description
• Transistor		
fQ3	46719900	DTC124
fQ4	46719900	DTC124
• IC		
fIC1	48161100	TC-9303N-002
fXO1	07237701	Quartz Element HC-18/U
• Diode		
fD1	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD2	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD3	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD4	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD5	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD6	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD20	07176400	1S2473HS (T-900/700 SA)
	or 03111800	1S1588 (T-900/700 SA)
fD21	03117600	1S2473T77
	or 46086000	1S1588TP-3
		(T-900/700 XX, XX-V, SA)
		(T-900/700 XX, XX-V, SA)
fD22	03117600	1S2473T77 (T-900/700 XX, XX-V,
		SA AS & T-900L/700L)
	or 46086000	1S1588TP-3 (T-900/700 XX, XX-V,
		SA, AS & T-900L/700L)

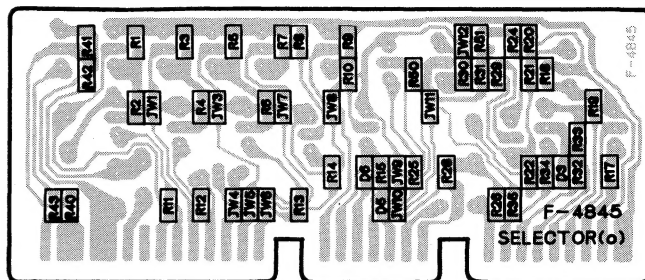
Parts No.	Stock No.	Description
fD23	03117600	1S2473T77
	or 46086000	(T-900/700 AS & T-900L/700L)
		1S1588
		(T-900/700 AS & T-900L/700L)
fD24	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD26	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD27	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD28	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD29	03117600	1S2473T77 (T-900L/700L)
	or 46086000	1S1588 (T-900L/700L)
fD30	03117600	1S2473T77 (T-900/900L)
	or 46086000	1S1588TP-3 (T-900/900L)
fD31	03117600	1S2473T77
	or 46086000	1S1588TP-3
fD32	03117600	1S2473T77
	or 46086000	1S1588TP-3
fC13	46643300	1000μF 6.3V E.C.
oS2	46396700	Push SW., PRESET SCAN
oS3	46396700	Push SW., AUTO/MANUAL
oS4	46396700	Push SW., DOWN
oS5	46396700	Push SW., UP
oS6	46396700	Push SW., FM
oS7	46396700	Push SW., AM or MW/LW
sFL1	48182600	FL. Display Tube FG78M1GR
sPL1	48201600	Pilot Lamp

3-5. F-4845 AM/FM Band Selector Board (Stock No. 00888601 = T-900/700) (Stock No. 00888605 = T-900L/700L)

Component Side



Pattern Side <Chip Parts>



Parts List

Parts No.	Stock No.	Description
•Transistor		
oQ1	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
oQ4	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
oQ5	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
oQ6	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
oQ9	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
oQ10	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
oQ11	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
oQ12	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
oQ13	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
oQ14	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
oQ15	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
oQ16	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
oQ17	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
•Diode		
oD1	46464000	MC921 (Chip)
oD2	46464000	MC921 (Chip)
oD3	46852000	RLS-73 (Chip)
oD5	46852000	RLS-73 (Chip)
oD6	46852000	RLS-73 (Chip)
oJW1	46741100	Cross Conductor (Chip)
oR1	46749200	4.7k Ω 1/8W Chip R.
oR2	46750000	10k Ω 1/8W Chip R.

Parts No.	Stock No.	Description
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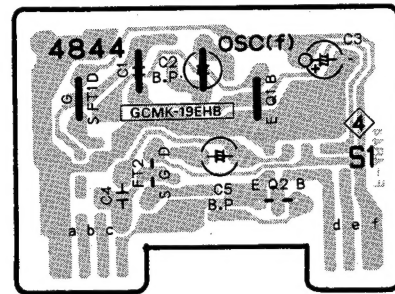
oR7	46749200	4.7k Ω 1/8W Chip R.
oR8	46750000	10k Ω 1/8W Chip R.
oR9	46749200	4.7k Ω 1/8W Chip R.
oR10	46750000	10k Ω 1/8W Chip R.
oR11	46750000	10k Ω 1/8W Chip R.
oR14	46750000	10k Ω 1/8W Chip R.
oR15	46750000	10k Ω 1/8W Chip R.
oR17	46750000	10k Ω 1/8W Chip R.
oR18	46748200	1.8k Ω 1/8W Chip R.
oR19	46747000	560 Ω 1/8W Chip R.
oR20	46750800	22k Ω 1/8W Chip R.
oR21	46749200	4.7k Ω 1/8W Chip R.
oR22	46749200	4.7k Ω 1/8W Chip R.
oR25	46750000	10k Ω 1/8W Chip R.
oR26	46752400	100k Ω 1/8W Chip R.
oR28	46752400	100k Ω 1/8W Chip R.
oR29	46749200	4.7k Ω 1/8W Chip R.
oR30	46749000	3.9k Ω 1/8W Chip R.
oR31	46754600	820k Ω 1/8W Chip R.
oR32	46750400	15k Ω 1/8W Chip R.
oR33	46752200	82k Ω 1/8W Chip R.
oR34	46750000	10k Ω 1/8W Chip R.
oR35	46750000	10k Ω 1/8W Chip R.
oR40	46748800	3.3k Ω 1/8W Chip R.
oR41	46747600	1k Ω 1/8W Chip R.
oR42	46748800	3.3k Ω 1/8W Chip R.
oR43	46747600	1k Ω 1/8W Chip R.
oR50	46747400	820 Ω 1/8W Chip R.
oR51	46750800	22k Ω 1/8W Chip R.
<T-900L/700L>		
•Transistor		
oQ2	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
oQ3	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
oQ7	46367301	2SC2458
	or 46367101	2SC2603
	or 46391901	2SC2785
oQ8	46367301	2SC2458
	or 46367101	2SC2603
	or 46391901	2SC2785
oR3	46749200	4.7k Ω 1/8W Chip R.
oR4	46750000	10k Ω 1/8W Chip R.
oR5	46749200	4.7k Ω 1/8W Chip R.
oR6	46750000	10k Ω 1/8W Chip R.
oR11	46750000	10k Ω 1/8W Chip R.
oR12	46750000	10k Ω 1/8W Chip R.

T-900/900L
T-700/700L

T-900/900L
T-700/700L

3-6. F-4844 Loop Filter Board (Stock No. 00888401 = T-900/700) (Stock No. 00888405 = T-900L/700L)

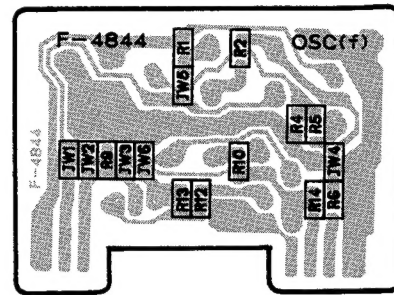
Component Side



Parts List

Parts No.	Stock No.	Description
•Transistor fQ2	46367101 or 46367301 or 46391901	2SC2603 2SC2458 2SC2785
•FET fFT2	46643501 or 46643502 or 46643601 or 46643602	2SK163-K2 2SK163-L1 2SK117-Y 2SK117-GR
fJW1	46741100	Cross Conductor (Chip)
fR9	46750800	22k Ω 1/8W Chip R.
fR10	46748000	1.5k Ω 1/8W Chip R.
fR12	46746400	330 Ω 1/8W Chip R.
fR13	46746000	220 Ω 1/8W Chip R.
fR14	46749600	6.8k Ω 1/8W Chip R.
fC5	48103500	2.2 μ F 50V E.B.
<T-900/700> fJW2	46741100	Cross Conductor (Chip)

Pattern Side <Chip Parts>

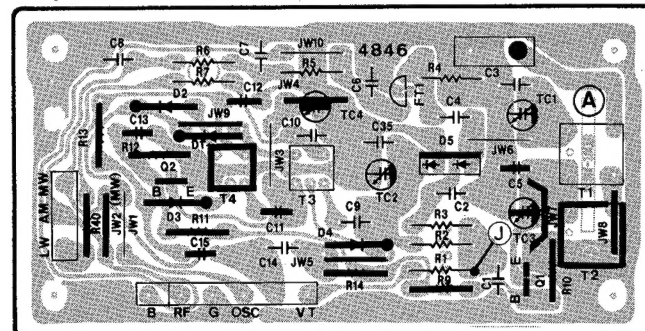


Parts No. Stock No. Description

<T-900L/700L>		
•Transistor fQ1	46367101 or 46367301 or 46391901	2SC2603 2SC2458 2SC2785
fFT1	46643501 or 46643502 or 46643601 or 46643602	2SK163-K2 2SK163-L1 2SK117-Y 2SK117-GR
fJW4	46741100	Cross Conductor (Chip)
fJW5	46741100	Cross Conductor (Chip)
fR1	46750800	22k Ω 1/8W Chip R.
fR2	46748600	2.7k Ω 1/8W Chip R.
fR4	46746000	220 Ω 1/8W Chip R.
fR5	46746400	330 Ω 1/8W Chip R.
fR6	46747600	1k Ω 1/8W Chip R.
fC2	48103400	1 μ F 50V E.B.

3-7. F-4846 AM RF Amp. Board (Stock No. 00878901 = T-900/700) (Stock No. 00878905 = T-900L/700L)

Component Side



Parts List

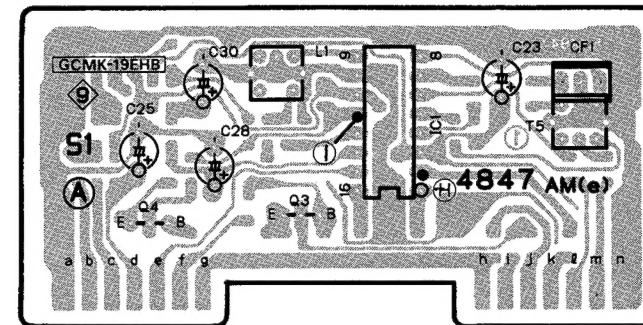
Parts No.	Stock No.	Description
•FET eFT1	46393000 or 46393001	2SK192A-Y 2SK192A-GR
eD5	46146300	Variable Capacitance Diode KV1236Z2
eTC1	46162800 or 46437400	Trimmer Capacitor 20pF Trimmer Capacitor 20pF
eTC2	46162800 or 46437400	Trimmer Capacitor 20pF Trimmer Capacitor 20pF

Parts No. Stock No. Description

eT1	46394600	AM ANT Coil
eT3	48074300	MW OSC Coil
<T-900L/700L>		
•Transistor eQ1	46540801	2SC2878
eQ2	46540801	2SC2878
•Diode eD1	03117600 or 46086000	1S2473T77 1S1588
eD2	03117600 or 46086000	1S2473T77 1S1588
eD3	03117600 or 46086000	1S2473T77 1S1588
eD4	03117600 or 46086000	1S2473T77 1S1588
eTC3	46437400 or 46162800	Trimmer Capacitor 20pF Trimmer Capacitor 20pF
eTC4	46437400 or 46162800	Trimmer Capacitor 20pF Trimmer Capacitor 20pF
eT2	46397900	LW RF Coil
eT4	48074400	LW OSC Coil

3-8. F-4847 AM IF Amp. Board (Stock No. 00879001 = T-900/700) (Stock No. 00879005 = T-900L/700L)

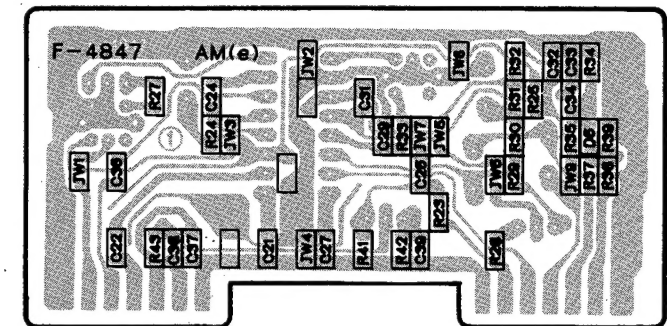
Component Side



Parts List

Parts No.	Stock No.	Description
•Transistor eQ3	46202901 or 46203001	2SC1674 2SC1675
eQ4	46367101 or 46367301 or 46391901	2SC2603 2SC2458 2SC2785
•IC eIC1	03608000	LA1240
•Diode eD6	46852000	RLS-73 (Chip)
eJW2	46741100	Cross Conductor (Chip)
eR23	46751600	47k Ω 1/8W Chip R.
eR24	46747600	1k Ω 1/8W Chip R.
eR25	46745200	100 Ω 1/8W Chip R.
eR27	46744400	47 Ω 1/8W Chip R.
eR28	46750800	22k Ω 1/8W Chip R.
eR29	46748400	2.2k Ω 1/8W Chip R.
eR30	46750000	10k Ω 1/8W Chip R.
eR31	46750000	10k Ω 1/8W Chip R.
eR32	46747600	1k Ω 1/8W Chip R.
eR33	46745200	100 Ω 1/8W Chip R.
eR34	46752400	100k Ω 1/8W Chip R.
eR35	46751800	56k Ω 1/8W Chip R.
eR37	46751600	47k Ω 1/8W Chip R.

Pattern Side <Chip Parts>



Parts No. Stock No. Description

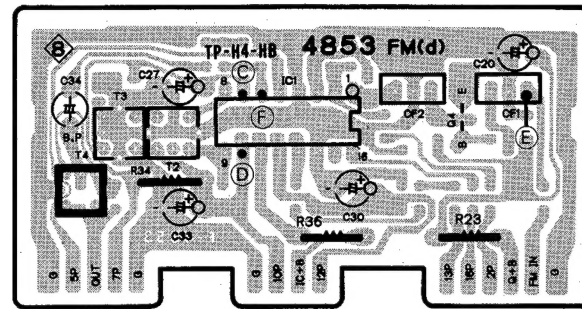
eR38	46754400	680k Ω 1/8W Chip R.
eR39	46753200	220k Ω 1/8W Chip R.
eR41	46751200	33k Ω 1/8W Chip R.
eR42	46746400	330 Ω 1/8W Chip R.
eR43	46748400	2.2k Ω 1/8W Chip R.
eC21	46794300	1000pF 50V Chip C.
eC22	46854500	0.022 μ F 50V Chip C.
eC24	46854500	0.022 μ F 50V Chip C.
eC26	46854500	0.022 μ F 50V Chip C.
eC27	46854500	0.022 μ F 50V Chip C.
eC29	46795500	0.01 μ F 50V Chip C.
eC31	46795500	0.01 μ F 50V Chip C.
eC32	46854900	0.047 μ F 50V Chip C.
eC33	46794300	1000pF 50V Chip C.
eC34	46854900	0.047 μ F 50V Chip C.
eC36	46795500	0.01 μ F 50V Chip C.
eC37	46795500	0.01 μ F 50V Chip C.
eC38	46854500	0.022 μ F 50V Chip C.
eC39	46854900	0.047 μ F 50V Chip C.
eL1	46369600	AM IF Coil
<T-900/700> eT5	48069800	Ceramic Filter CFLZ450
<T-900L/700L> eCF1	48069900	Ceramic Filter

T-900/900L
T-700/700L

T-900/900L
T-700/700L

3-9. F-4853 FM IF Amp. Board (Stock No. 00903301)

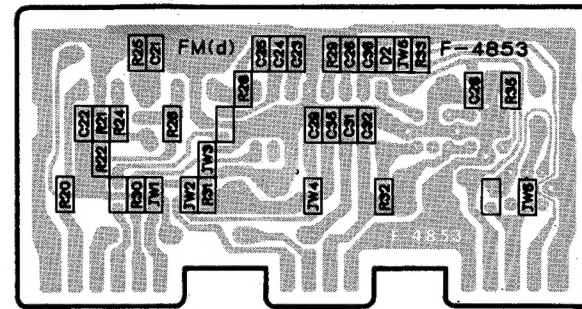
Component Side



Parts List

Parts No.	Stock No.	Description
•Transistor		
dQ4	46393201	2SC2786
•IC		
dIC1	07191200	LA1231N
•Diode		
dD2	46852000	RLS-73 (Chip)
dJW1~6	46741100	Cross Conductor (Chip)
dR20	46745800	180Ω 1/8W Chip R.
dR21	46747000	560Ω 1/8W Chip R.
dR22	46747600	1kΩ 1/8W Chip R.
ΔdR23	46228700	56Ω 1/2W N.I.R.
dR24	46745200	100Ω 1/8W Chip R.
dR25	46747400	820Ω 1/8W Chip R.
dR26	46746600	390Ω 1/8W Chip R.
dR28	46746400	330Ω 1/8W Chip R.
dR29	46752400	100kΩ 1/8W Chip R.
dR30	46750000	10kΩ 1/8W Chip R.
dR31	46750200	12kΩ 1/8W Chip R.
dR32	46750400	15kΩ 1/8W Chip R.

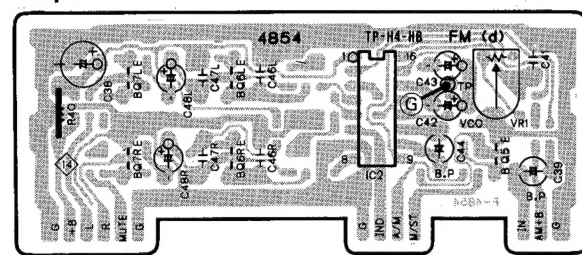
Pattern Side <Chip Parts>



Parts No.	Stock No.	Description
dR33	46752400	100kΩ 1/8W Chip R.
dR35	46748800	3.3kΩ 1/8W Chip R.
ΔdR36	46228700	56Ω 1/2W N.I.R.
dC21	46854500	0.022μF 50V Chip C.
dC22	46854900	0.047μF 50V Chip C.
dC23	46854900	0.047μF 50V Chip C.
dC24	46854900	0.047μF 50V Chip C.
dC25	46854900	0.047μF 50V Chip C.
dC26	46778100	100pF 50V Chip C.
dC28	46854500	0.022μF 50V Chip C.
dC29	46854500	0.022μF 50V Chip C.
dC31	46854900	0.047μF 50V Chip C.
dC32	46854900	0.047μF 50V Chip C.
dC34	48102400	4.7μF 25V E.B.
dC35	46796400	0.022μF 50V Chip C.
dCF1	46202500	Ceramic Filter SFE10.7MS2(RED)
dCF2	46202500	Ceramic Filter SFE10.7MS2(RED)
dT2	48072100	FM IF Coil
dT3	48072200	FM IF Coil

3-10. F-4854 FM MPX Board (Stock No. 00879701)

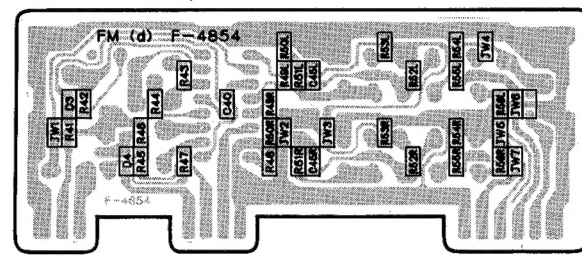
Component Side



Parts List

Parts No.	Stock No.	Description
•Transistor		
dQ5	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
dQ6	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
dQ7	46540801	2SC2878
•IC		
dIC2	48169300	BA1332
•Diode		
dD3	46852000	RLS-73 (Chip)
dD4	46852000	RLS-73 (Chip)
dJW1~7	46741100	Cross Conductor (Chip)
ΔdR40	46228200	22Ω 1/2W N.I.R.
dR41	46751200	33kΩ 1/8W Chip R.
dR42	46749800	8.2kΩ 1/8W Chip R.
dR43	46747600	1kΩ 1/8W Chip R.

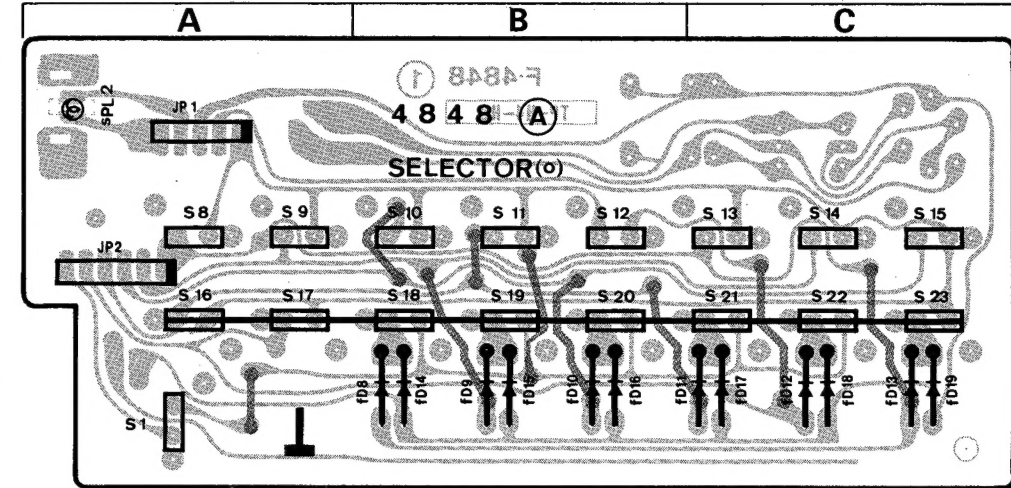
Pattern Side <Chip Parts>



Parts No.	Stock No.	Description
dR44	46750000	10kΩ 1/8W Chip R.
dR45	46750000	10kΩ 1/8W Chip R.
dR46	46750200	12kΩ 1/8W Chip R.
dR47	46751600	47kΩ 1/8W Chip R.
dR48	46747400	820Ω 1/8W Chip R.
dR49	46749200	4.7kΩ 1/8W Chip R.
dR50	46748800	3.3kΩ 1/8W Chip R.
dR51	46747600	1kΩ 1/8W Chip R.
dR52	46747200	680Ω 1/8W Chip R.
dR53	46745400	120Ω 1/8W Chip R.
dR54	46752000	68kΩ 1/8W Chip R.
dR55	46747800	1.2kΩ 1/8W Chip R.
dR56	46748800	3.3kΩ 1/8W Chip R.
dC39	48102400	4.7μF 25V E.B.
dC40	46854900	0.047μF 50V Chip C.
dC44	48103400	1μF 50V E.B.
dC45	46778300	120pF 50V Chip C.
dC46	46283100	0.015μF 50V F.C.
dC47	46282800	8200pF 50V F.C.
dVR1	07241200	5kΩ (B) S.V.R., V.C.O. adj.

3-11. F-4848 PRESET STATION SW. Board

Component Side



Parts List

Parts No.	Stock No.	Description
oS1	46396700	Push SW., MEMORY
oS8	46396700	Push SW., PRESET STATION 1
oS9	46396700	Push SW., PRESET STATION 2
oS10	46396700	Push SW., PRESET STATION 3
oS11	46396700	Push SW., PRESET STATION 4
oS12	46396700	Push SW., PRESET STATION 5
oS13	46396700	Push SW., PRESET STATION 6
oS14	46396700	Push SW., PRESET STATION 7
oS15	46396700	Push SW., PRESET STATION 8
sPL2	48201500	Pilot Lamp

<T-900/900L>

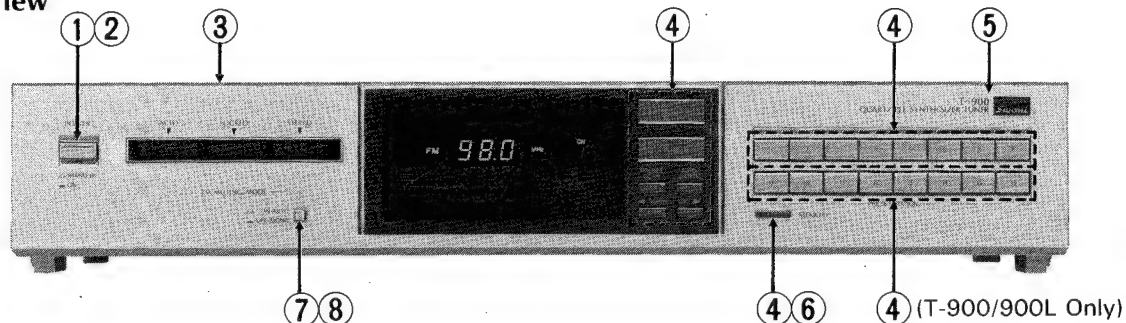
•Diode

fd8	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd9	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd10	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd11	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd12	03117600	1S2473T77
	or 46086000	1S1588TP-3

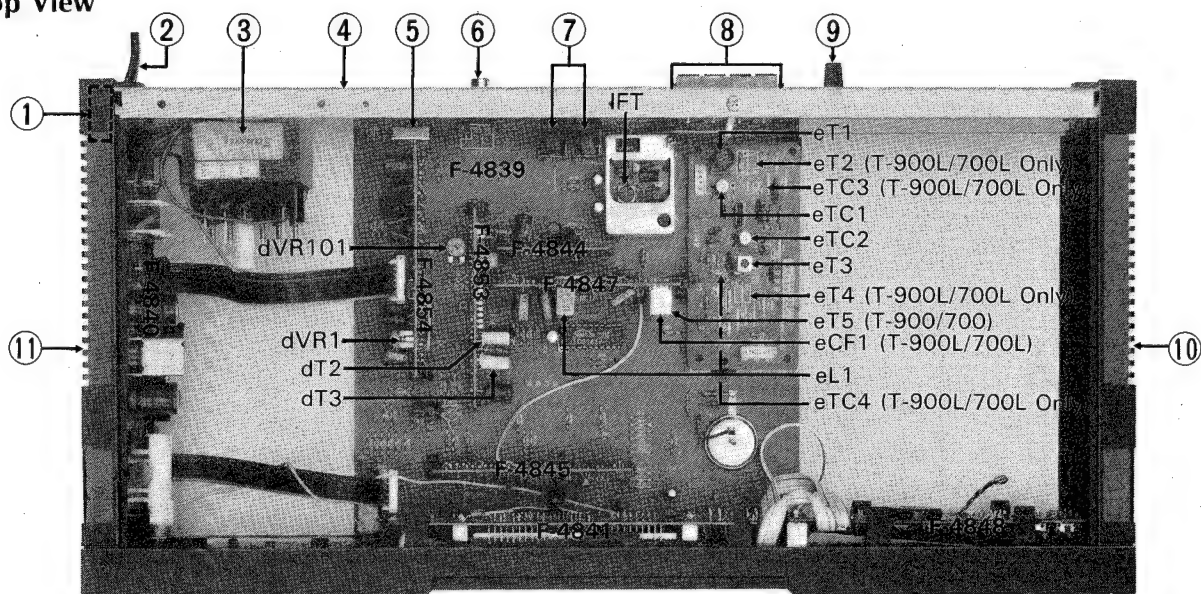
Parts No.	Stock No.	Description
fd13	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd14	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd15	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd16	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd17	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd18	03117600	1S2473T77
	or 46086000	1S1588TP-3
fd19	03117600	1S2473T77
	or 46086000	1S1588TP-3
oS16	46396700	Push SW., PRESET STATION 9
oS17	46396700	Push SW., PRESET STATION 10
oS18	46396700	Push SW., PRESET STATION 11
oS19	46396700	Push SW., PRESET STATION 12
oS20	46396700	Push SW., PRESET STATION 13
oS21	46396700	Push SW., PRESET STATION 14
oS22	46396700	Push SW., PRESET STATION 15
oS23	46396700	Push SW., PRESET STATION 16

4. OTHER PARTS

4-1. Front View



4-2. Top View



Parts List <Front View>

Parts No.	Stock No.	Description
△ 2	48186800	Push SW., POWER (T-900/700 XX, XX-V, SA, AS & T-900L/700L)
△ 4	48186900	Push SW., POWER (T-900/700 UL, CSA)
4	46396700	Push SW., MEMORY, PRESET SCAN, AUTO/MANUAL, DOWN, UP, AM (T-900/700) or MW/LW (T-900L/700L), PRESET STATION 1~8, PRESET STATION 9~16 (T-900/900L Only)
6	47816400	Push Knob, MEMORY
8	46603000	Push SW., FM MUTING/MODE

<Silver Model>

1	47747000	Push Knob, POWER
3	47879600	Bonnet
5	47865100	Front Panel Ass'y (T-900)
	47865300	Front Panel Ass'y (T-900L)
	47865800	Front Panel Ass'y (T-700)
	47866000	Front Panel Ass'y (T-700L)
7	47816000	Push Knob, FM MUTING/MODE

<Black Model>

1	47747100	Push Knob, POWER
3	47879700	Bonnet
5	47865200	Front Panel Ass'y (T-900)
	47865400	Front Panel Ass'y (T-900L)
	47865900	Front Panel Ass'y (T-700)
	47866100	Front Panel Ass'y (T-700L)
7	07931600	Push Knob, FM MUTING/MODE

Parts List <Top View>

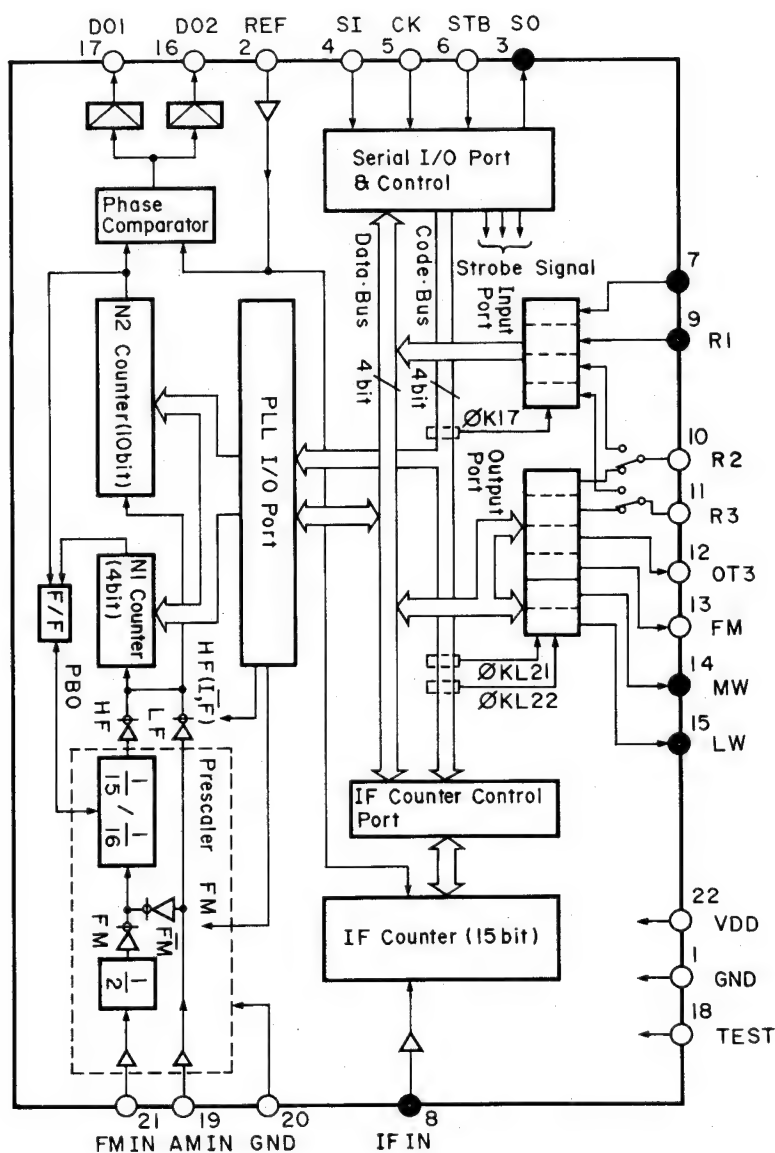
Parts No.	Stock No.	Description
1	47831100	AC Cord Cover
△ 2	38005400	Power Supply Cord (T-900/700 XX, XX-V, SA)
△	38004700	Power Supply Cord (T-900/700 UL, CSA)
△	38004500	Power Supply Cord (T-900L/700L EU)
△	38004300	Power Supply Cord (T-900L/700L BS)
△	07204200	Power Supply Cord (T-900/700 AS)
△ 3	15020301	Power Transformer (T-900/700 XX, SA)
△	15020309	Power Transformer (T-900/700 UL, CSA)
△	15020302	Power Transformer (T-900/700 UL, CSA)
△	15020305	Power Transformer (T-900/700 AS & T-900L/700L)
△ 4	07204700	Slide SW, Voltage Selector (T-900L/700L)
△	48175200	Plug, Voltage Selector (T-900/700 XX-V)
5	46177200	AM 9 kHz/10 kHz Selector (T-900/700 XX, XX-V)
6	46438100	2P Terminal, LINE OUT
7	46547200	Jack, REMOTO CONTROL, COMPU SELECTOR
8	46547300	4P Terminal Antenna
9	22301510	Ground Terminal
10	47873000	Right Side Panel Ass'y <Silver Model>
	47873100	Right Side Panel Ass'y <Black Model>
11	47872800	Left Side Panel Ass'y <Silver Model>
	47872900	Left Side Panel Ass'y <Black Model>

5. DESCRIPTION OF PLL SYNTHESIZER & THE CONTROL IC

A. Terminal Function of PLL Synthesizer IC, TC-9182P

Pin No.	Symbols on substate	Functions
2	REF	Reference frequency signal input terminal
3	SO	Serial data output terminal
4	SI	Serial data input terminal
5	CK	Clock signal input terminal
6	STB	Strobe signal input terminal
•Terminals to input/output serial data for frequency divider, IF counter and I/O port controller from/to TC-9303N-002 PLL synthesizer control IC.		
8	IF _{IN}	Terminal to input IF signal for performing the automatic search stop.
9	R1	Terminals to input signals from the remote controller. 7-kind key input instructions are available in combination with TC-9303N-002.
10	R2	
11	R3	

Pin No.	Symbols on substate	Functions
13	FM	Band selector signal output terminal
14	MW	
15	LW	
16	DO ₂	Terminals to output a signal from a phase comparator.
17	DO ₁	
18	TEST	Terminal to input a signal of test mode.
19	AM _{IN}	Terminal to input a signal from the AM local OSC.
20	GND	Ground terminal for prescaler
21	FM _{IN}	Terminal to input a signal from the FM local OSC.
22	V _{DD}	Power supply terminals. 5V ± 0.5V
1	GND	Ground terminal

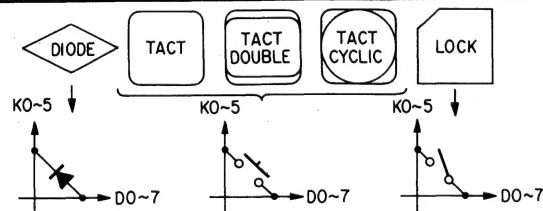


B. Description of PLL Synthesizer control IC, TC-9303N-002

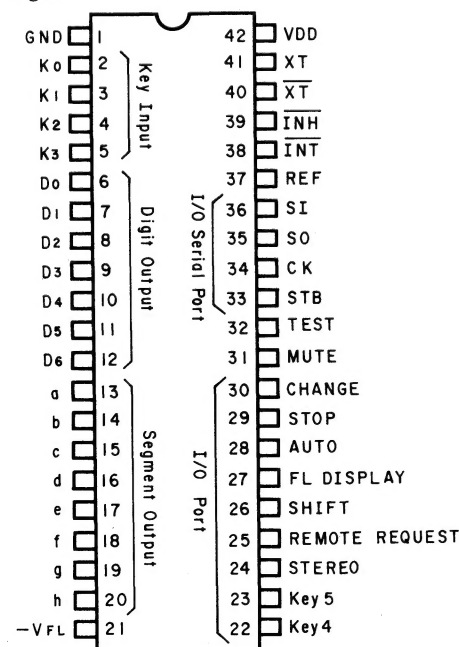
1. Various Key Matrix Functions

•Key Matrix

Key Input Terminal of TC9303N-002						
	K5	K4	K3	K2	K1	K0
07	FM EI	FM EO		MANUAL		MEMORY
06	MW EI	MW EO	MW/LW	UP	+10	+10
04		LW EO	FM	DOWN	10	5
03			MONO	FM MUTE OFF	9	4
02	LW ENA	RANDOM		MANUAL AUTO	8	3
01	FMIF+50K	FMIF-50K		BAND	7	2
00	20/10	12/6	MEMORY HOLD SCAN	MEMORY INCREMENT	6	1



•Chip Diagram



•Reception Range

	Desti-nation	KEY MATRIX		Reception	IF	Step (kHz)
		E ₀	E ₁			
F M	USA	0	0	87.5 ~ 108.0	+	100
	EU	1	0	87.50 ~ 108.00	+	50
	Japan	0	1	76.0 ~ 90.0	-	100
	SABS	1	1	87.50 ~ 108.00	-	50
M W	USA	0	0	530 ~ 1610		10
	EU	1	0	522 ~ 1611		9
	SAUDI	0	1	531 ~ 1602		9
	Japan	1	1	522 ~ 1629		9
L W		0	-	153 ~ 281		1
		1	-	153 ~ 360		1

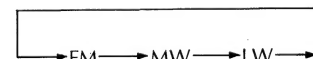
•FM IF Shift/Offset

- a) When SHIFT port is at "H" input, FM IF is always offset as shown by Table below.

KEY MATRIX		LOCAL UP	LOCAL LOW
◊ -50kHz	◊ +50kHz	USA, EU	Japan, SABS
—	—	10.70 MHz	10.70 MHz
○	—	10.65	10.75
—	○	10.75	10.65
○	○	10.70	10.70

•Band Selection

- a) When **FM** key is depressed in MW or LW, FM is set. When **FM** key is depressed in FM band, only CHANGE output is set to "H".
- b) In the absence of **LW ENA** diode:
- When **MW/LW** key is depressed in FM, MW is set. When **MW/LW** key is depressed in MW, only CHANGE output is set to "H".
 - When **BAND** key is depressed or when remote control BAND is requested, FM changes to MW or vice versa cyclically for each one-depression or for each request.
- c) In the presence of **LW ENA** diode:
- When **MW/LW** key is depressed in FM, FM changes to MW by the first depression, and thereafter LW changes to MW or vice versa cyclically for each depression.
 - When **BAND** key is depressed or when remote control BAND is requested, the reception band changes in sequence as shown below for each depression or for each request:



•Auto-Search Tuning

Tuning operation stops in case where a stop signal is detected in Auto-Search Tuning operated by depressing **UP** or **DOWN** key.

•Manual Tuning

- When **UP** or **DOWN** key is depressed, tuning advances one step for each depression (one step/one push).
- If the key is kept depressed for 0.5 seconds or more, one step/one push tuning changes to continuous tuning. However, when the key is released, the tuning operation stops.
- When tuning reaches one band edge, the tuning operation jumps to another band edge. After a stop interval of 5 seconds, tuning returns to one step/one push tuning or continuous tuning.

•Preset Memory

- b) Access to Preset Memory

Preset memory can be accessed by depressing any one of **M1** to **M10** keys or **Mn** and **+10** keys simultaneously.

Note) Accessable by depressing either or both of **+10** keys (D₆-K₀, D₆-K₁).

- d) Writing

When **MEMORY** key is kept depressed, **MEMORY** and **CH** indications blink at 0.5-sec intervals.

When **Mn** key is depressed simultaneously with **MEMORY** key kept depressed, the present frequency is written in the memory, **MEMORY** indication going off and **CH** indication coming on.

•Memory Hold Scanning

Broadcast is received in order while reading data stored in each preset memory 5 seconds by seconds.

•Memory Increment

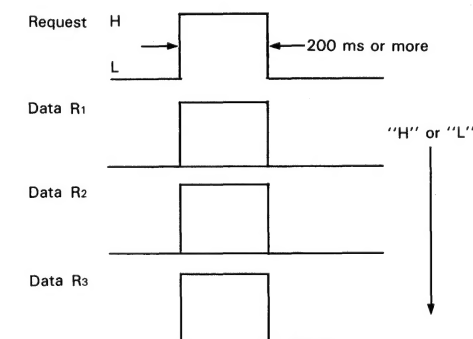
Broadcast is received while reading data stored in each preset memory in sequence.

Remote Control Request input port of TC-9303N and Data R₁, R₂, R₃ uboyr oier id TC-9182P.

2. I/O Port Functions

•Remote Control Input

- Main function
7-kind key input instructions are available in combination with TC 9182.
- Input Port
Remote Control Request input port of TC-9303N and Data R₁, R₂, R₃ input port of TC-9182P.
- Input signals



These request signals are always monitored. All the key input instructions are inhibited when a request signal is at "H". Remote control instructions have priority over others.

A continuous signal is usable for manual up/down tuning operation.

4. Functions

Input Port			Function	
R ₁	R ₂	R ₃		
1	1	1	NOP	Only CHANGE Output
1	1	0	BAND	
0	1	0	MEMORY INCREMENT	
0	0	1	MONO ↔ STEREO	Cyclic
1	0	1	MUTE OFF ↔ ON	Cyclic
0	1	1	DOWN	Continuous
0	0	0	UP	Continuous
1	0	0	MANUAL ↔ AUTO	Cyclic

- NOP is an input function for designating tuners and outputs only a CHANGE output.
- The other functions are the same as these of TACT input key.

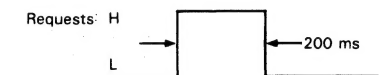
•Mute Output

System Mute Time

- When INH changes from "L" to "H": 1.5 sec
- When band is switched: 1.0 sec
- When memory is accessed (in the same band): 0.5 ~ 1 sec
- In FM MANUAL tuning: 0.5 sec
- In MW, LW MANUAL tuning: 0.2 sec
- In AUTO-Tuning Stop: 0.5 sec
- When INH changes from "H" to "L": 0.1 sec

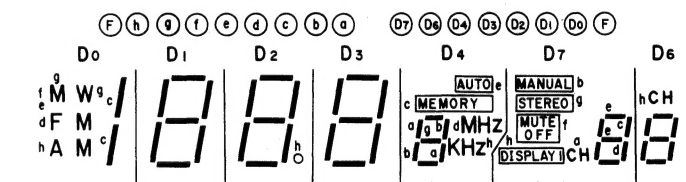
•CHANGE Output (For Compuselector signal)

- When INH changes from "L" to "H".
- When each input key is depressed normally.
- When a band key corresponding to the presently received band is depressed.
- When remote control REQUEST changes to "H" (inclusive of NOP).



Note) CHANGE is not outputted when INH changes from "H" to "L".

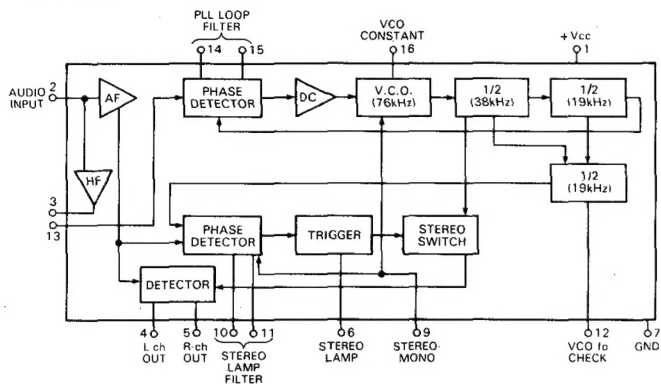
•Indication by Digits and Segments



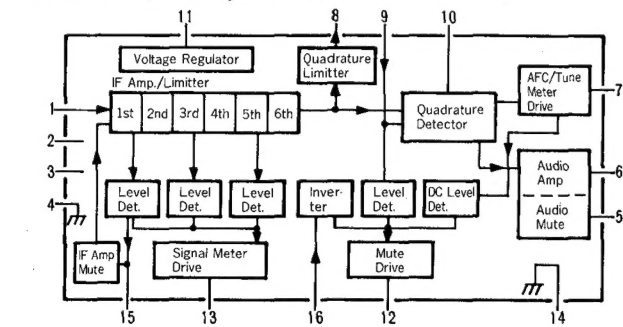
		Digit Output						
		D ₀	D ₁	D ₂	D ₃	D ₄	D ₇	D ₆
Segment Output	a	—	a	a	a	5	CH	a
	b	—	b	b	b	8	MANUAL	b
	c	8	c	c	c	MEMORY	8	c
	d	FM	d	d	d	MHz	8	d
	e	MW	e	e	e	AUTO	8	e
	f	MW	f	f	f		MUTE OFF	f
	g	MW	g	g	g	8	STEREO	g
	h	AM		●		kHz	DISPLAY1	CH

7. INTERIOR BLOCK DIAGRAM OF IC

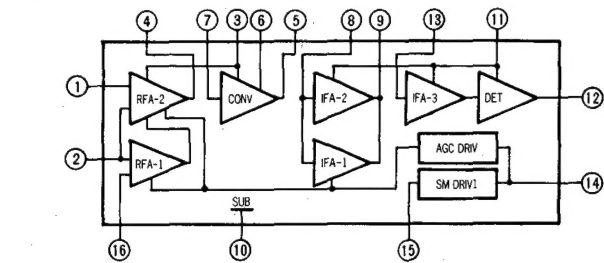
•BA1332 (MPS IC)



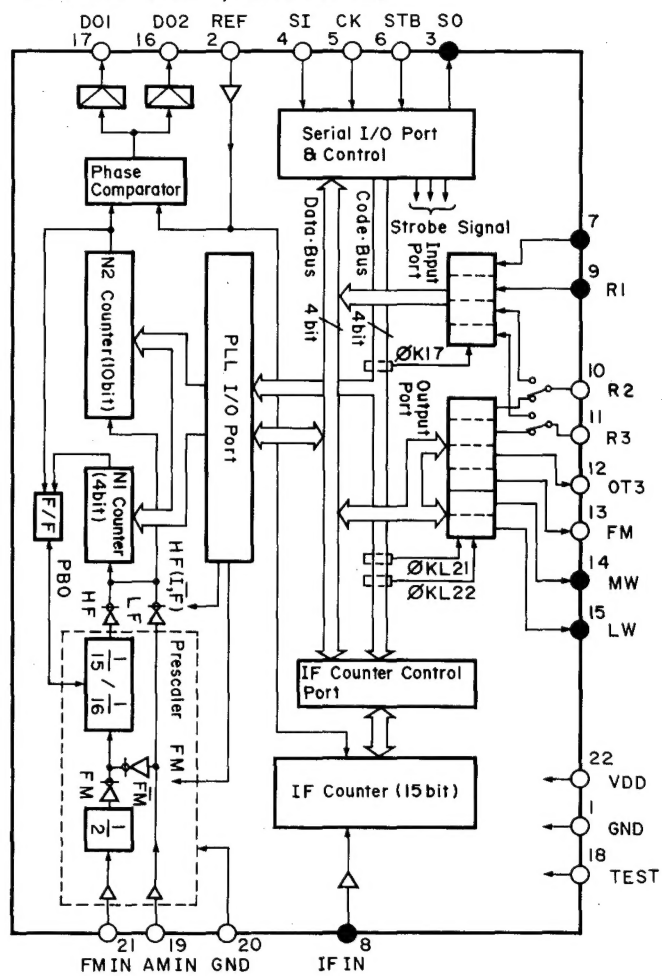
•LA1231N (IF & Quadrature Detector IC)



- LA1240 (AM Tuner IC)

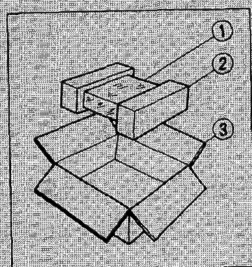


•TC-9182P (PLL Synthesizer IC)



8. PACKING LIST

Parts No.	Stock No.	Description
1	47859300	Vinyl Bag
2	07965300	Styrofoam Packing
< Silver Model >		
3	47830000	Carton Case (T-900 XX, UL, CSA, SA, AS)
	47810000	Carton Case (T-700 XX, UL, CSA, SA, AS)
	47830200	Carton Case (T-900 XX-V)
	47810200	Carton Case (T-700 XX-V)
	47830400	Carton Case (T-900L)
	47810400	Carton Case (T-700L)
< Black Model >		
3	47830100	Carton Case (T-900 XX, UL, CSA, SA, AS)
	47810100	Carton Case (T-700 XX, UL, CSA, SA, AS)
	47830300	Carton Case (T-900 XX-V)
	47810300	Carton Case (T-700 XX-V)
	47830500	Carton Case (T-900L)
	47810500	Carton Case (T-700L)



9. ACCESSORY LIST

Stock No.	Description
46145700	AM Loop Antenna
48181400	Mini Pin Plug Cord
46051700	FM Antenna
38103200	Pin Plug Cord
07563000	Antenna Holder
46968600	Operating Instruction (T-900/700)
46968700	Operating Instruction (T-900L/700L)

•Note: XX-V <EXPORT (V)> Standard Version with Outer Voltage Selector.
(“V” mark is indicated on the carton case.)



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Printed in Japan (150420M) <Stock No. 36513500>